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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/014,795	12/14/2001	Elizabeth Acton	608-326	4355

7590

04/24/2003

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EXAMINER

KUHAR, ANTHONY J

ART UNIT

PAPER NUMBER

1754

DATE MAILED: 04/24/2003

14

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n N .

10/014,795

Examiner

Anthony J Kuhar

Applicant(s)

ACTON ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3/4/03 in paper no. 13.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-18 and 25-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-18 and 25-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 8, 16, and 25-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0916 622 A1.

Page 4, line 23 teaches dispersing a crystal into water to form a slurry. On page 4, lines 13-14, a crystal with a same or similar form as a scale substance with an average diameter of 0.05 to 100 μm is disclosed. The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a prima facie case of obviousness, in re Malagari, 182 USPQ 549. The slurry is added to process water in the condition of supersaturation containing the scale substance (see page 4, lines 51-54). Page 2, lines 22-24 and 43-44 teach various solid surfaces which scale forms onto and that the process of the present invention prevents scale formation on submerged surfaces. It appears from the examples that the weight percent of the seed crystals from the dispersion to that of the seed crystals and mineral salts is between 10 and 50%. Also in the examples, a 50% by weight dispersion of seed crystals was used. Page 3, lines 40-41 teach alkaline earth metal carbonates and sulfates as the crystals, including calcium carbonate.

Page 4, line 12 teaches dimension ratios encompassed by instant claim 28, but for calcium sulfate. However, barium sulfate is also listed as a crystal on page 3, line 40 and would be obvious to one of ordinary skill of the art to use the same ratios for barium sulfate as the crystal seed since barium and calcium sulfates have substantially similar molecular structures and are both alkaline earth compounds.

Claims 9, 10, 14, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0916 622 A1 as applied to claims 8, 16, and 25-30 above, and further in view of Thijssen '886.

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The above 103(a) rejection over EP 0916622A1 is incorporated herein.

EP 0916622A1 does not teach the composition comprising the dispersion of seed crystals is obtained by subjecting an aqueous supersaturated solution of the mineral salt or a salt isomorphous with the mineral salt to sonic or ultrasonic vibration.

However, Thijssen '886, in another process for crystallization teaches nuclei formation may occur by supersaturation or by subjecting the solution to ultrasonic vibrations, which is a physical disturbance. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to form the nuclei or crystals in dispersion required by the EP reference using the method of Thijssen because Thijssen gives a method for producing the dispersion of crystals required by EP 0916622 A1. It would have been obvious to use the product of one process as a reactant in another process if they are similar materials and the "other process" requires the product. See *In re Kamlet* 88 USPQ 106 CCPA 1950. Because both the prior art and the applicant disclose similar processes and the idea of using ultrasound in the crystal nuclei forming step, one would expect the diameter of crystals produced with ultrasound in the prior art also to be 0.025 to 0.5 times that of those produced without ultrasound. Also, regarding claim 14, the degree of concentration (supersaturation) would appear to be suggested by Thijssen.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0916 622 A1 as applied to claims 8, 16, and 25-30 above, and further in view of Baumgard '966.

The above 103(a) rejection over EP 0916622A1 is incorporated herein.

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EP 0916622 A1 does not disclose operating the crystallization process in series or parallel.

Baumgard '966 teaches a similar crystallization process where a crystal suspension of a particular enantiomer is added to a mixture of enantiomers; the crystallization process is preferred in series or parallel mode. At the time the invention was made, one of ordinary skill in the art would have been motivated to use the methods of EP 0916622 A1 with the teachings of Baumgard because Baumgard teaches that in series, the crystals of the first process can be used to seed crystallization in the next process (see column 5, lines 20-25). Baumgard also teaches in parallel, there is a high space time yield of crystals, which in the case of the applicant means fewer crystals in solution will be available to scale on the walls of the equipment. Also, there is an advantage in not interrupting the process in case one piece of equipment breaks down (see column 5, lines 25-30). One of ordinary skill in the art would have been motivated to do this because these advantages contribute to the economic efficiency of the process itself.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0916 622 A1 as applied to claims 8, 16, and 25-30 above, and further in view of Steward '194.

The above 103(a) rejection over EP 0916622A1 is incorporated herein.

EP 0916622 A1 does not disclose an aqueous precursor liquid that is converted to a supersaturated solution by cooling, reducing pressure, or adding a complementary ion.

Steward '194 discloses, in a similar process for crystallization, a two stage process where the temperature of a solution is reduced to induce crystallization in a first stage to produce crystals of a small particle size, and these crystals are sent to a second stage to induce

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crystallization in a supersaturated solution (see claim 1). At the time the invention was made, one of ordinary skill in the art would have been motivated to use the method of EP 0916622A1 and additionally cool a solution to supersaturation before formation of small crystals in a dispersion because Steward teaches the preformed crystals can be used as to scour heat exchange surfaces and prevent crystal growth on these surfaces (see column 2, lines 25-32). One of ordinary skill in the art would have been motivated to do this because cooling the initial solution first to supersaturation helps to form the initial small crystals, which ultimately helps prevent scaling on equipment surfaces.

Claim 11, 13, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0916 622 A1 in view of Thijssen '886 as applied to claims 9, 10, and 14 above, and further in view of Botsaris '966.

The above 103(a) rejection over EP 0916622A1 in view of Thijssen '886 is incorporated herein.

The EP and Thijssen references do not disclose the length of time of ultrasound, the frequency of the ultrasound, nor supercooling the aqueous precursor liquid in the crystallization zone.

However, Botsaris '966 teaches, in a similar crystallization process, the use of ultrasound to initiate nucleation in a two step crystallization process (see column 2, lines 45-50). Frequencies of 20-23 kHz are taught in column 4, line 27 and residence times of 1 to 15 minutes are taught in column 4, lines 39-30. The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have selected the

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overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a prima facie case of obviousness, in re Malagari, 182 USPQ 549. Column 3, lines 25-29 show the liquid in the crystallizer is maintained at a supercooled temperature. At the time the invention was made, one of ordinary skill in the art would have used the frequency and residence time taught by Botsaris with the process taught by EP '622 in view of Thijssen '886 because Botsaris teaches that the use of ultrasound in his invention enables nucleation at low levels of supercooling, excellent control of the process, and easy scale-up (see column 3, lines 50-63). One of ordinary skill in the art would have been motivated to do this because the benefits of ultrasound listed hitherto contribute to better efficiency of the process.

Claim 11, 12, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0916 622 A1 in view of Thijssen '886 as applied to claims 9, 10, and 14 above, and further in view of Lindrud '958.

The above 103(a) rejection over EP 0916622A1 in view of Thijssen '886 is incorporated herein.

Neither EP '622 nor Thijssen '886 teaches the frequency of nor the power applied by the ultrasound.

However, Lindrud '958 discloses a process for crystallizing sub-micron size particles using a sonication probe along with impinging jets to achieve high intensity micromixing of fluids so as to form a homogenous composition prior to the start of nucleation (see column 1, lines 64-65). A high level of supersaturation exists at the point where the two jets contact (see column 1, lines 31-32). A frequency of 20 kHz is disclosed in column 3, line 5 as well as a

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power requirement of up to 500 watts in column 3, line 13. Depending on the size of the vessel and the residence time of the liquid, which would be obvious for one skilled in the art to adjust to optimize the crystal size, this translates to about $1\text{-}100\text{ J/cm}^3$ (see *In re Aller et al*, 105 USPQ 233.) At the time the invention was made, it would have been obvious to one of ordinary skill in the art to use the sonication probe and impinging jets of Lindrund with the process of EP '622 in view of Thijssen '886 because Lindrund teaches crystallization occurs rapidly within the mixing volume at the impinging point of the two liquids, which would provide the dispersion of crystals required in the process of EP '622 in view of Thijssen '886. It would have been obvious to use the product of one process as a reactant in another process if they are similar materials and the "other process" requires the product. See *In re Kamlet* 88 USPQ 106 CCPA 1950. One of ordinary skill in the art would have been motivated to do this because a better dissolution rate in the crystallization zone of Thijssen means a better availability of these small crystals for other crystals in the solution to grow on rather than producing scale on equipment.

Response to Arguments

Applicant's arguments filed 3/4/03 have been considered but are moot in view of the new ground(s) of rejection.

Regarding applicant's argument that EP 0916 622 A1 does not teach the limitation 2 microns or less because of the recitation "preferably 5 to 50 microns", the argument is not persuasive because this is not a teaching away as applicant argues. There is still the recitation of "0.05 to 100 microns", and would be obvious to one of ordinary skill in the art to choose the smaller particle sizes within this range to suit a particular process, for example the highly

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reactive systems in the petrochemical industry as pointed out by applicant. The choice of particle size used in the processes in the examples of the EP reference does not limit the teaching to those particle sizes.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony J Kuhar whose telephone number is 703-305-7095. The examiner can normally be reached on 8:45 am - 5:15 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stan Silverman can be reached on 703-308-3837. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

AK
April 11, 2003


**STEVEN BOS
PRIMARY EXAMINER
GROUP 1100**